REMARKS

In the Final Office Action dated August 19, 2009, claims 1-11, 15-24, 28, 29, and 33 were rejected under 35 U.S.C. 112, first paragraph. Claims 1-8, 10-11, 15-19, 21-24, 28, and 29 were rejected under 35 U.S.C. 103(a) over cited portions of U.S. Patent No. 5,814,565 "*Reichert*", cited portions of U.S. Patent No. 5,955,130 "*Iturralde*", cited portions of U.S. Patent No. 5,968,324 "*Cheung*" and cited portions of U.S. Patent Application Publication No. 2003/0008500 "*Nguyen*". Claims 4-5 and 23-24 were rejected under 35 U.S.C. 103(a) *Reichert*, *Iturralde*, *Cheung*, *Nguyen* and cited portions of U.S. Patent No. 5,042,895 "*Chouinard*". Claim 9 was rejected under 35 U.S.C. 103(a) over *Reichert*, *Iturralde*, *Cheung*, *Nguyen* and cited portions of Applied Surface Science 86 (1995) 582-590 "*Farrell*". Claims 20 and 23 were rejected under 35 U.S.C. 103(a) over *Reichert*, *Iturralde*, *Cheung*, *Nguyen* and cited portions of U.S. Patent No. 5,904,491 "*Ojha*".

Claims 1-2, 17 and 21 have been amended to avoid the use of "inorganic". Claim 1 is further amended to recite that the RF source power is not zero prior to the discrete increase. Support for the amendment can be found in paragraphs [0048]-[0052]. No claims have been canceled or added. Following entry of this Amendment, claims 1-11, 15-24, 28-29 and 33 stand pending for examination.

A. The Rejection under 35 U.S.C. § 112 is Addressed

The rejection of claims 1-11, 15-24, 28, 29, and 33 under 35 U.S.C. 112, first paragraph, is made moot by the Amendment. Claims 1-2, 17 and 21 have been amended to remove the term "inorganic". Accordingly, withdrawal of the rejection is respectfully requested.

B. The Rejections under 35 U.S.C. § 103(a) are Addressed

These rejections are respectfully traversed in view of amended independent claims 1 and 21, which generally describe methods of forming optical waveguides over a substrate and are reproduced below.

1. A method for processing a film over a substrate in a process chamber, the method comprising:

flowing a process gas mixture suitable for processing the film over the substrate in the process chamber in accordance with a predetermined algorithm specifying process conditions;

monitoring a parameter during processing of the film over a thickness greater than 3 μm; and

changing the process conditions in response to a measured optical property of the film, wherein changing the process conditions comprises increasing, discretely, a non-zero RF source power. (emphasis added)

* * *

21. A method for forming an optical waveguide over a substrate in a process chamber, the method comprising:

forming a plasma in the process chamber;

flowing a process gas mixture comprising a silicon-containing gas and an oxygen-containing gas in the process chamber in accordance with a predetermined algorithm specifying process conditions to deposit a film over the substrate;

monitoring a refractive-index value of the film during deposition of the film over a thickness greater than 3 μm; and

changing the process conditions during deposition in accordance with a correlation between the refractive-index value and the process conditions, wherein changing the process conditions comprises increasing an RF source power, continuously, for maintaining the plasma.

The subject matter of these claims are neither described nor suggested by *Reichert*, *Iturralde*, *Cheung*, *Nguyen* or the other references used for dependent claim rejections, taken alone or in combination.

Reichert discusses forming a waveguide layer having a refractive index higher than the substrate by ensuring the nitrogen content is higher in the deposited waveguide layer than it is in the silicon oxynitride of the substrate. *Iturralde* discusses using an optical technique (ellipsometry) to monitor the refractive index and adjust the flow rate ratio of reactive gases. *Cheung* discusses the dependence of the index of refraction of silicon oxynitride on plasma power level.

The Office Action indicates that *Cheung* discusses "modifying the RF power of the process during deposition" (see Page 6 ll 14-15). Applicants point out that *Cheung* simply

discusses the dependence of index on plasma power and does not discuss modifying the plasma power *during* deposition. Please see the pertinent portion of *Cheung* reproduced below:

> [*Cheung* col 6 ll 36-40] Alternatively, increasing the power supplied to RF power supply 25 to generate more plasma has the effect of decreasing the refractive index n, absorptive index k, and reflectance r values while increasing the thickness of the ARL deposited. (emphasis added)

The discussion within this portion of *Cheung* (and all other portions) is consistent with the process of selecting a fixed process parameter for a recipe and the description does not teach or suggest modifying the plasma power during the recipe. Thus, *Reichert*, *Iturralde* and *Cheung* do not teach or suggest increasing an RF source power discretely or continuously as recited in each of independent claims 1 and 21.

The Office Action relies on *Nguyen* to supply the teaching lacking from *Reichert*, *Iturralde* and *Cheung*. *Nguyen* discusses a PECVD chamber designed to pulse the plasma power as described in the Office Action (see Page 7 ll 13-15) whose pertinent portion is reproduced below

> [Office Action Page 7 ll 13-15] *Nguyen* et al further teaches a process of discretely controlling the power application (on and off multiple times) to the RF generator in order to produce a pulsed plasma for the CVD process [0009].

Applicants agree that *Nguyen* simply discusses a plasma power pulse train and does not discuss varying the RF power, e.g. during a pulse. In contrast to *Nguyen*, independent claim 1 recites "increasing, discretely, a non-zero RF source power."

The Office Action also relies on *Nguyen* to teach the corresponding portion of claim 21. The following portion of the Office Action (page 7 ll 4-8) represents the interpretation of *Nguyen* which forms the basis of the U.S.C. 103(a) rejection of independent claim 21:

> [Office Action Page 7 ll 4-8] However, *Nguyen* et al is directed towards methods for controlling plasma enhanced CVD processes [0002], it teaches that these processes are conventionally performed in a continuous fashion, in order to apply large amounts of power and deposit films quickly [0004], this means that the power is not discretely applied, but is varied in a continuous fashion, both when it is increased or decreased. (emphasis added)

The pertinent portion of *Nguyen* is reproduced below:

> [*Nguyen* paragraph 0004] Conventionally, plasma is continuously generated in order to obtain the large amount of power necessary to deposit the layers at high speed and thereby to improve the shapes of stepped parts thereof (coverage). As noted in U.S. Pat. No. 5,468,341 entitled "Plasma-etching method and apparatus therefor", the amount of ion energy reaching a surface of the object to be etched in conventional RF sources can be accomplished by controlling the power of RF waves, the controllable range of dissociation process in plasmas is narrow and, therefore, the extent of controllable etching reactions on the surface of the object wafer is narrowly limited. Also, since the magnetic fields are present in a plasma generation chamber for high-density plasmas, a magnetohydrodynamic plasma instability can exist due to, for example, drift waves generated in the plasmas, which leads to a problem wherein the ion temperature rises and the directions of ion motions become nonuniform. Further, the problems include a degradation of a gate oxide film and a distortion of etching profile due to the charges accumulated on the wafer. (emphasis added)

This passage simply indicates that plasma is applied continuously rather than pulsed. In contrast, independent claim 21 recites "increasing an RF power, continuously" which is not taught or suggested in *Nguyen*.

Reichert, *Inrralde*, *Cheung*, *Nguyen* and the other relied-upon references do not teach or suggest, either alone or in combination, modifying plasma power in the manner recited in independent claims 1 and 21. For at least the reasons given above, independent claims 1 and 21 and their dependent claims are allowable over *Reichert*, *Inrralde*, *Cheung*, *Nguyen* and the other relied-upon references. Accordingly, withdrawal of the claim rejections under 103(a) is respectfully requested.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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